

EPA NEW ENGLAND'S REVIEW of VERMONT'S
**TMDL FOR TRIBUTARY #1 TO NORTH BRANCH
BALL MOUNTAIN BROOK**

TMDL: Tributary #1 to North Branch Ball Mountain Brook (Waterbody ID: VT11-15)

DATE: March 15, 2000

IMPAIRMENT/POLLUTANT: Habitat degradation (high substrate embeddedness) primarily from excessive sand/silt loading. The TMDL is proposed for sediment.

REVIEWERS: Alison Simcox (617) 918 -1684 Email simcox.alison@epa.gov
Eric Perkins (617) 918-1602 Email perkins.eric@epa.gov

BACKGROUND: The Vermont Department of Environmental Conservation (VTDEC) submitted to EPA New England the *Draft Total Maximum Daily Load for Tributary #1 to North Branch Ball Mountain Brook*, dated January, 2000. The TMDL was submitted under a cover letter, dated January 24, 2000, requesting review and comments by EPA New England. The submittal was received by EPA New England on January 26, 2000. The following is a summary of EPA's review which explains where the TMDL submission satisfies (and where additional work will be necessary to satisfy) the statutory and regulatory requirements of TMDLs in accordance with Section 303(d) and 40 CFR Part 130. In addition to reviewing the TMDL document, EPA New England also reviewed the May 20, 1999 report by Pioneer Environmental Associates, Llc., *The Stratton Corporation Stratton Master Plan Water Quality Remediation Plan* (referred to as 'the Stratton Master Plan' below), which provides the technical basis for the TMDL.

REVIEW ELEMENTS OF TMDLs

Section 303(d) of the Clean Water Act (CWA) and EPA's implementing regulations at 40 C.F.R. § 130 describe the statutory and regulatory requirements for approvable TMDLs. The following information is generally necessary for EPA to determine if a submitted TMDL fulfills the legal requirements for approval under Section 303(d) and EPA regulations, and should be included in the submittal package. Use of the verb "must" below denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation.

1. Description of Waterbody, Pollutant of Concern, Pollutant Sources and Priority Ranking

The TMDL analytical document must identify the waterbody as it appears on the State/Tribe's 303(d) list, the pollutant of concern and the priority ranking of the

*waterbody. The TMDL submittal must include a description of the point and nonpoint sources of the pollutant of concern, including the magnitude and location of the sources. Where it is possible to separate natural background from nonpoint sources, a description of the natural background must be provided, including the magnitude and location of the source(s). Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. The TMDL submittal should also contain a description of any important assumptions made in developing the TMDL, such as: (1) the assumed distribution of land use in the watershed; (2) population characteristics, wildlife resources, and other relevant information affecting the characterization of the pollutant of concern and its allocation to sources; (3) present and future growth trends, if taken into consideration in preparing the TMDL; and, (4) explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments, or chlorophyll *a* and phosphorus loadings for excess algae.*

The TMDL for Tributary #1 to North Branch Ball Mountain Brook describes the waterbody and the cause of impairment as identified in Vermont's 1998 303(d) list. The document describes the pollutant of concern, sediment. It also addresses altered hydrologic conditions that, although not considered 'pollutants' by EPA, play a direct role in both sediment loading and stream habitat alteration. The document states that the waterbody is among those scheduled for TMDL development by 2002.

Comments:

- a) We recommend that the document expand the discussion of priority ranking to note that the early scheduling on the 303(d) list indicates a relatively high priority ranking, assuming this is the case.
- b) The TMDL references the Stratton Master Plan for the location and relative magnitude of sediment sources, which fall into categories including road crossings, drainage ditches, and parking lots. To improve clarity and make the TMDL more of a stand alone document, please include the following information from the Stratton Master Plan in the TMDL: 1) the prioritized list of sediment sources, and 2) a description of the factors or criteria used to rank the sources.
- c) The Memorandum from Steven Fiske dated November 7, 1997 attached to the TMDL identifies the causes of aquatic life impairment as habitat degradation from sand/silt and nutrient enrichment which has resulted in excessive filamentous algae. The TMDL should address (either here or in other sections) the nutrient impairment and provide an explanation of how the proposed TMDL will address this cause of impairment. Since phosphorus has a strong affinity to particulate matter, it is likely that significant reductions in solids loading will also result in significant reductions of phosphorus loading. Are the anticipated phosphorus loading reductions together with restoration of riparian vegetation sufficient to curb the growth of filamentous algae? Considering the magnitude of sediment reductions proposed and the complexities/uncertainties involved with predicting benthic algae and nutrient dynamics, we believe a qualitative discussion would

suffice. It appears likely that the MOS inherent in the selection of the % embeddedness target will account for the uncertainties related to nutrient enrichment.

2. Description of the Applicable Water Quality Standards and Numeric Water Quality Target

The TMDL submittal must include a description of the applicable State/Tribe water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the antidegradation policy. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation. A numeric water quality target for the TMDL (a quantitative value used to measure whether or not the applicable water quality standard is attained) must be identified. If the TMDL is based on a target other than a numeric water quality criterion, then a numeric expression, usually site specific, must be developed from a narrative criterion and a description of the process used to derive the target must be included in the submittal.

The TMDL for Tributary #1 to North Branch Ball Mountain Brook describes the applicable water quality standards, which include narrative criteria as well as the designated uses for a Class B water, which specify that the water be "...of a quality that consistently exhibits good aesthetic value and provides high quality habitat for aquatic biota, fish and wildlife." The TMDL also cites Vermont's antidegradation policy. VT DEC has interpreted its narrative criteria for Tributary #1 by selecting a quantitative water quality target using in-stream macroinvertebrate biocriteria. The water-quality target is set using biometrics shown on Table 1 of the TMDL (p. 4) specifying numeric goals for indices such as organism density, species richness, EPT/richness and the biotic index. Once these targets are achieved, VT DEC predicts Tributary #1 will fully support an aquatic community consistent with Vermont's Class B Water Quality Standards. The TMDL also specifies sediment targets in terms of percent imbeddedness and percent Oligocheata.

Comment: Adequately addressed, but see comment above regarding nutrient enrichment.

3. Loading Capacity - Linking Water Quality and Pollutant Sources

As described in EPA guidance, a TMDL identifies the loading capacity of a waterbody for a particular pollutant. EPA regulations define loading capacity as the greatest amount of loading that a water can receive without violating water quality standards (40 C.F.R. § 130.2(f)). The loadings are required to be expressed as either mass-per-time, toxicity or other appropriate measure (40 C.F.R. § 130.2(i)). The TMDL submittal must identify the waterbody's loading capacity for the applicable pollutant and describe the rationale for the method used to establish the cause-and-effect relationship between the numeric target and the identified pollutant sources. In most instances, this method will be a water quality model. Supporting documentation for the TMDL analysis must also be contained in the submittal, including the basis for assumptions, strengths and weaknesses in the analytical process, results

from water quality modeling, etc. Such information is necessary for EPA's review of the load and wasteload allocations which are required by regulation.

In many circumstances, a critical condition must be described and related to physical conditions in the waterbody as part of the analysis of loading capacity (40 C.F.R. § 130.7(c)(1)). The critical condition can be thought of as the "worst case" scenario of environmental conditions in the waterbody in which the loading expressed in the TMDL for the pollutant of concern will continue to meet water quality standards. Critical conditions are the combination of environmental factors (e.g., flow, temperature, etc.) that results in attaining and maintaining the water quality criterion and has an acceptably low frequency of occurrence. Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards.

The TMDL identifies a number of numeric water quality targets including invertebrate biometrics and sediment indices. VT has determined, based on extensive monitoring, that the aquatic life impairment is due to habitat degradation caused by excessive deposition of fine sediments, although nutrient enrichment is also identified in the attached Fiske Memo. Therefore, the primary numeric water quality target in the TMDL used to establish the link between sediment loading and water quality is % embeddedness.

VT DEC used Best Professional Judgment (BPJ) based on an extensive visual assessment of the watershed for Tributary #1 to link the desired water-quality target to sediment source areas. EPA New England concurs with this approach for addressing nonpoint source pollution concerns, especially when it is possible to identify pollutant sources, but difficult to estimate loading from those sources.

Comments:

a) A target of < 25 % embeddedness is presented. The TMDL needs to provide the basis for selecting the < 25 % value. While this could be as simple as explaining that this value represents an embeddedness rating of good to excellent according to the rapid bioassessment protocols for use in streams and rivers, the TMDL needs to clearly describe the basis. Refer also to the comment below regarding quantification of the allowable sedimentation load at 25 % embeddedness.

b) EPA New England supports VT DEC's general approach of identifying and ranking sediment sources without quantifying the magnitude of individual sources. We feel that VT DEC's decision to omit loading estimates for individual sources is reasonable because of the complexities involved with predicting the magnitude of sources, the fate and transport of solids in a watershed, and the lack of site specific sediment data. However, we have concluded that some quantification of overall sediment loading is needed in the TMDL to help describe the extent of the impairment, and more importantly, to estimate the magnitude of the overall sediment loading reduction needed to achieve water quality goals.

The following is one example of a simple approach that would be acceptable and would provide a reasonable estimate of the magnitude of the solids loading reduction needed. VT DEC is clearly free to propose some other method to quantify the loading if desired.

1) View sediment loading from the point of view of the stream bed. In other words, estimate the existing sedimentation load using the % embeddedness measurements. This approach estimates the actual loading to the bed (the cause of the impairment) based on observations and eliminates many of the uncertainties and complexities involved with monitoring water column suspended solids concentrations and predicting the fate and transport of sediment originating from the watershed.

2) Using the median size (D-50) of the natural substrate estimate the volume of the interstitial space between cobbles per unit area for the 75 % depth (existing impaired conditions) and 25% depth (desired conditions).

3) Estimate the mass of fine sediments in place for the 75% depth and 25% depth. First, estimate the volume of the solid material (e.g., sand) for each depth by multiplying the total volume of the interstitial space for each corresponding depth by $(1 - n)$ (porosity)). For a loose sand mixture, the porosity is approximately 0.40. Compute the mass of the sand by multiplying the volume of the sand by the density of sand (2.65 gm/cm^3). This product will give the loading per unit area (e.g., square meter).

Based on the above simple approach it is possible to express the loading capacity in terms of a load (sedimentation load). We do not consider it necessary to express this TMDL in terms of a loading rate (i.e., mass per unit time). Regardless, the TMDL should explain why its being expressed in terms other than mass per day. This could be accomplished by discussing the nature of sediment loading and deposition in mountain streams. Because sediment loading is largely a function of runoff characteristic related to rainfall and snow melt events, daily loading is clearly not appropriate. Annual loading may give a better overall indication of the magnitude of reductions needed, yet it's not perfect either because of the dynamics involved with sediment generation and transport in mountain streams and the role that large infrequent storms have on moving sediment.

c) Assuming the final TMDL submittal is revised to include a loading quantification method similar to that suggested above, the document will need to include a revised statement of strengths and weaknesses of the analytical process.

4. Load Allocations (LAs)

EPA regulations require that a TMDL include LAs, which identify the portion of the loading capacity allocated to existing and future nonpoint sources and to natural background (40 C.F.R. § 130.2(g)). Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. § 130.2(g)). Where it is possible to

separate natural background from nonpoint sources, load allocations should be described separately for background and for nonpoint sources.

If the TMDL concludes that there are no nonpoint sources and/or natural background, or the TMDL recommends a zero load allocation, the LA must be expressed as zero. If the TMDL recommends a zero LA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero LA implies an allocation only to point sources will result in attainment of the applicable water quality standard, and all nonpoint and background sources will be removed.

Comments:

A quantitative load allocation should be provided in the TMDL. Using the example approach discussed above, the load allocation could be given in the form of a percent reduction in solids loading. For example, the reduction in fines sedimentation loading to reduce embeddedness from 75% to < 25 % could be calculated and presented as a load allocation. The required reduction in fine loading to the streambed should be the same reduction that is necessary of total solids loading from the watershed, since the fines make up a portion of the total solids load.

Please note that if post implementation monitoring reveals that the specified biocriteria (and therefore water quality standards) are met before the full load reduction goal is achieved, EPA will consider the overall TMDL goal accomplished and will not expect or require additional load reduction efforts.

5. Wasteload Allocations (WLAs)

EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to existing and future point sources (40 C.F.R. § 130.2(h)). If no point sources are present or if the TMDL recommends a zero WLA for point sources, the WLA must be expressed as zero. If the TMDL recommends a zero WLA after considering all pollutant sources, there must be a discussion of the reasoning behind this decision, since a zero WLA implies an allocation only to nonpoint sources and background will result in attainment of the applicable water quality standard, and all point sources will be removed.

In preparing the wasteload allocations, it is not necessary that each individual point source be assigned a portion of the allocation of pollutant loading capacity. When the source is a minor discharger of the pollutant of concern or if the source is contained within an aggregated general permit, an aggregated WLA can be assigned to the group of facilities. But it is necessary to allocate the loading capacity among individual point sources as necessary to meet the water quality standard.

The TMDL submittal should also discuss whether a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will

occur. In such cases, the State/Tribe will need to demonstrate reasonable assurance that the nonpoint source reductions will occur within a reasonable time.

The watershed of Tributary #1 does not include any point sources, and therefore, the WLA is set at zero (see TMDL page 6). EPA-New England concludes that the WLA component of the TMDL is appropriately set equal to zero based on VT DEC's determination that there are no point sources present in the watershed.

Comment: Adequately addressed.

6. Margin of Safety (MOS)

The statute and regulations require that a TMDL include a margin of safety to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)). EPA guidance explains that the MOS may be implicit, i.e., incorporated into the TMDL through conservative assumptions in the analysis, or explicit, i.e., expressed in the TMDL as loadings set aside for the MOS. If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS must be described. If the MOS is explicit, the loading set aside for the MOS must be identified.

Comment: The TMDL proposes that a MOS is inherent because the approach relies on continuing monitoring and remediation measures that are not considered complete until Water Quality Standards are met. However, EPA cannot accept post implementation monitoring as a MOS. One area where an implicit MOS might easily be identified is in the selection of the embeddedness target. Since the embeddedness rating is “good” for the 25% to 50% range (according to the Fisk memo), there appears to be some conservativeness built into the selection of the <25% target. Please modify the MOS statement to reflect this or similar basis.

7. Seasonal Variation

The statute and regulations require that a TMDL be established with consideration of seasonal variations. The method chosen for including seasonal variations in the TMDL must be described (CWA § 303(d)(1)(C), 40 C.F.R. § 130.7(c)(1)).

Comment: The TMDL adequately addresses seasonal variation in loading by setting an overall water-quality target and focusing on source control or elimination rather than setting a daily load. However, this section of the TMDL could be strengthened by clearly stating that the TMDL will be protective of water quality throughout the year and that the selected numeric water quality endpoints represent water quality conditions that are a result of the cumulative impacts of both dry and wet weather conditions that occur over an extended period of time.

8. Monitoring Plan for TMDLs Developed Under the Phased Approach

EPA's 1991 document, Guidance for Water Quality-Based Decisions: The TMDL Process (EPA 440/4-91-001), recommends a monitoring plan when a TMDL is developed under the phased approach. The guidance recommends that a TMDL developed under the phased approach also should provide assurances that nonpoint source controls will achieve expected load reductions. The phased approach is appropriate when a TMDL involves both point and nonpoint sources and the point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur. EPA's guidance provides that a TMDL developed under the phased approach should include a monitoring plan that describes the additional data to be collected to determine if the load reductions required by the TMDL lead to attainment of water quality standards.

Stratton Corporation, under VT DEC's guidance, will continue to support long-term monitoring of Tributary #1 (see Stratton Master Plan, p. 46) to evaluate the effectiveness of sediment controls and the adequacy of the TMDL. The Stratton Master Plan describes the parameters, stations and frequency of this monitoring which will continue at least through 2005. VT DEC expects water quality targets to be met by or before 2005. The monitoring will include the Pebble Count Procedure and Percent Embeddedness along with macroinvertebrate monitoring and a host of chemical and physical parameters.

Comment: Adequately addressed -- EPA New England concludes that the proposed monitoring will be sufficient to evaluate the adequacy of the TMDL over the next five years.

9. Implementation Plans

On August 8, 1997, Bob Perciasepe (EPA Assistant Administrator for the Office of Water) issued a memorandum, "New Policies for Establishing and Implementing Total Maximum Daily Loads (TMDLs)," that directs Regions to work in partnership with States/Tribes to achieve nonpoint source load allocations established for 303(d)-listed waters impaired solely or primarily by nonpoint sources. To this end, the memorandum asks that Regions assist States/Tribes in developing implementation plans that include reasonable assurances that the nonpoint source load allocations established in TMDLs for waters impaired solely or primarily by nonpoint sources will in fact be achieved. The memorandum also includes a discussion of renewed focus on the public participation process and recognition of other relevant watershed management processes used in the TMDL process. Although implementation plans are not approved by EPA, they help establish the basis for EPA's approval of TMDLs.

The TMDL implementation plan for Tributary #1 is described on pages 8 and 9 of the TMDL and pages 37-39 of the Stratton Master Plan. Remediation measures will be implemented by Stratton Corporation and have been ranked according to the magnitude of their expected water quality benefits. A detailed implementation schedule provides for

the major sediment sources to be addressed first (some have already been completed), with most other measures occurring by 2000.

Comment: Adequately addressed -- EPA New England concludes that a strong implementation plan is in place to achieve the goals of the TMDL.

10. Reasonable Assurances

EPA guidance calls for reasonable assurances when TMDLs are developed for waters impaired by both point and nonpoint sources. In a water impaired by both point and nonpoint sources, where a point source is given a less stringent wasteload allocation based on an assumption that nonpoint source load reductions will occur, reasonable assurance that the nonpoint source reductions will happen must be explained in order for the TMDL to be approvable. This information is necessary for EPA to determine that the load and wasteload allocations will achieve water quality standards.

In a water impaired solely by nonpoint sources, reasonable assurances that load reductions will be achieved are not required in order for a TMDL to be approvable. However, for such nonpoint source-only waters, States/Tribes are strongly encouraged to provide reasonable assurances regarding achievement of load allocations in the implementation plans described in section 9, above. As described in the August 8, 1997 Perciasepe memorandum, such reasonable assurances should be included in State/Tribe implementation plans and "may be non-regulatory, regulatory, or incentive-based, consistent with applicable laws and programs."

As part of Vermont's Act 250 permit process, future development in the impaired watershed is not allowed until Water Quality Standards are met. Stratton Corporation, the primary landowner, will be ineligible for future development permits until Tributary 1 attains water quality standards. This provides a powerful incentive for implementation of the remediation measures. Additionally, the monitoring plan provides for annual reports to VT ANR indicating progress toward water quality targets. The reports will also indicate any modifications to remediation measures needed to meet these targets.

Comment: Adequately addressed -- EPA New England concludes that the TMDL provides adequate "reasonable assurances" as called for in EPA guidance.

11. Public Participation

EPA policy is that there must be full and meaningful public participation in the TMDL development process. Each State/Tribe must, therefore, provide for public participation consistent with its own continuing planning process and public participation requirements (40 C.F.R. § 130.7(c)(1)(ii)). In guidance, EPA has explained that final TMDLs submitted to EPA for review and approval must describe the State/Tribe's public participation process, including a summary of significant comments

and the State/Tribe's responses to those comments. When EPA establishes a TMDL, EPA regulations require EPA to publish a notice seeking public comment (40 C.F.R. § 130.7(d)(2)).

Inadequate public participation could be a basis for disapproving a TMDL; however, where EPA determines that a State/Tribe has not provided adequate public participation, EPA may defer its approval action until adequate public participation has been provided for, either by the State/Tribe or by EPA.

Comment: The public participation process for the Tributary #1 TMDL appears to be insufficient. The two main weaknesses appear to be: 1) the Act 250 permit process provided an opportunity for only those with "party status" to comment, and not the general public, and 2) notice was not provided to the public that the Stratton Master Plan would serve as the basis for the development of a TMDL pursuant to section 303(d) of the Clean Water Act. If this is the case, we must require that VT DEC and/or Stratton Corporation provide a new opportunity for public participation consistent with VT DEC's requirements. Please attach documentation of public participation to the final TMDL, including any public notice issued consistent with VT DEC's requirements. In the final TMDL submission, please include a summary of public comments and the responses to those comments.

12. Submittal Letter

A submittal letter should be included with the TMDL analytical document, and should specify whether the TMDL is being submitted for a technical review or is a final submittal. Each final TMDL submitted to EPA must be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute. The submittal letter, whether for technical review or final submittal, should contain such information as the name and location of the waterbody, the pollutant(s) of concern, and the priority ranking of the waterbody.

Comment: N/A